

## 2. How digital transformation impacts public institutions

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As demand from the public and private sector for digital goods and services increase, various public institutions are moving from analogue to digital. This chapter explores what this trend means for statistical processes across institutions, the ways in which national statistical offices will be implicated, and what the benefits of this process might be.

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*Successful digital transformation comes not from implementing new technologies but from transforming your organization to take advantage of the possibilities that new technologies provide. Major digital transformation initiatives are centered on re-envisioning customer experience, operational processes and business models. Companies are changing how functions work, redefining how functions interact, and even evolving the boundaries of the firm (Capgemini Consulting, 2011<sup>[4]</sup>).*

The dramatic growth of digital technologies and their adoption has transformed the way institutions function and the way people interact. Among other impacts, they have fostered innovation, revolutionised communications, increased trade, boosted investment, increased consumer choice, and facilitated better goods and services and easier technology transfers (OECD, 2019<sup>[5]</sup>). Digital technologies also can increase public service efficiency, foster transparency, and enhance citizen trust and participation (OECD, 2019<sup>[6]</sup>; European Commission, 2018<sup>[7]</sup>), leading to digital transformation across economies and societies. Just as their customers, employees and competitors are putting pressure on companies to embrace a digital transformation (Capgemini Consulting, 2011<sup>[4]</sup>), citizens, the private sector and policy makers are also urging governmental organisations to move from analogue to digital.

## 2.1. Digitalisation can fundamentally change statistical processes

Digital transformation refers to the adoption of digital tools and methods by an organisation, whether it is a business, government or other types of organisation (Observatory of Public Sector Innovation, 2020<sup>[8]</sup>). Such a transformation integrates technology and data into all areas and functions, fundamentally changing how organisations operate and deliver value to their stakeholders. While private sector companies were the first to adopt digital technologies, many governments have started to move away from paper-based processes. More and more public entities are progressively interacting with citizens and businesses as e-governments or digital governments to improve efficiency by delivering services online (UN, 2020). Some now have recognised the need to shift to a more holistic approach to their digitalisation.<sup>1</sup>

**Modern digital technologies are needed to efficiently acquire, store, process, analyse, disseminate and make sense of newly available and complex data.**

To address some of the world's most acute challenges — climate change, the Sustainable Development Goals, systemic poverty and global pandemics, to name only a few — governments are increasingly harnessing the power of data for evidence-based decision making (Vogl et al., 2019<sup>[9]</sup>). Rigid, traditional and not fully digital statistical methods, coupled with outdated technological environments, can hinder their ability to produce those richer, real-time insights that decision makers now request (UNECE, 2021<sup>[10]</sup>). Modern digital technologies are needed to efficiently acquire, store, process, analyse, disseminate and make sense of newly available and complex data. Such a fundamental digital transformation requires substantial initial investments, for instance, for procurement and capacity development and in new procedures and governance systems. But these investments will ultimately pay off — enabling the cheaper, faster production of more numerous and more relevant official statistics for governments and societies (European Commission, 2017<sup>[11]</sup>).

At the same time, the challenges and crises facing societies highlight the risk of delaying the digital transformation of governments. The COVID-19 pandemic, probably more than any previous crisis, exposed the digital divide between high-income countries and low and middle-income countries while also highlighting the role digitalisation plays as a factor in social and geographic inequalities (De', Pandey and Pal, 2020<sup>[12]</sup>). In many western countries, for example, public sector employees were able to switch to mainly home-based work when required, thanks to pre-existing digital infrastructure and work practices.

But the digital infrastructure in many low and middle-income countries did not allow secure remote access to government systems and databases, leaving government institutions to choose between asking civil servants to stay home (in effect, closing their operational activities) and maintaining normal ways of working (and risking greater and quicker contagion).

## 2.2. The key role of NSOs in government digital transformation

National statistical offices (NSOs), particularly in low and middle-income countries, have experienced significant changes in recent years. Many have benefited from noteworthy improvements in their statistical processes, as has been shown by the 6 country examples in this study. Examples of advances include faster data collection using handheld devices and flawless data processing with sophisticated software tools (PARIS21, 2021, p. 7<sub>[1]</sub>).

NSOs are the primary government bodies collecting, processing and disseminating data at individual, local, regional and national levels. More than for other government institutions, their data-driven business model has a greater need for digitalisation and digital transformation, including the efficient management and processing of digital data; integration of cutting-edge technologies such as big data and remote sensing; and meeting the highest standards in terms of data security and privacy.

### ***NSOs can lead in harmonising digital transformation***

The growing diversity and complexity of data sources and of users' expectations require NSOs to undertake their own digital transformations

Traditionally, NSOs are responsible for the collection, processing, analysis, and dissemination of quality data needed for informed policy making (Open Data Watch, 2019<sub>[13]</sub>). The growing diversity and complexity of data sources (remote sensing, big data, administrative data, Internet-of-things, web-scraping, etc.) and of users' expectations (timeliness, interoperability, granularity, etc.) require NSOs to undertake their own digital transformations. However, this cannot happen in a closed silo. The NSO's systems must connect with those of other institutions — for example, population statistics pull data from administrative sources that are owned, hosted and managed by other governmental bodies [country example, Senegal]. Some NSOs, therefore, take an active and proactive role in shaping the overarching digitalisation of government institutions by contributing directly to the design of national data strategies and digital plans. The following are some examples:

- In implementing its Digital Strategy for Norwegian Development Policy, Statistics Norway is sharing Norwegian experiences on the development and use of basic public registers, including population, business, property and address registers (Norwegian Ministry of Foreign Affairs, 2018<sub>[14]</sub>).
- The Statistics Canada data strategy includes supporting and providing expertise on data to other federal, provincial and territorial government organisations; non-governmental organisations and academia; the private sector; and other national and international communities (Statistics Canada, 2018<sub>[15]</sub>).
- Statistics New Zealand, as the national data steward, co-ordinates the development of data policy, infrastructure, strategy and planning to help other agencies increase their capability to manage and use data through digital approaches (New Zealand Government, 2020<sub>[16]</sub>; Statistics New Zealand, 2021<sub>[17]</sub>).

- Statistics Estonia, the national data steward, plays a central role in the country's overall national digital transformation, is tasked with co-ordinating the country's overall data governance and substantially contributes to reducing duplication of data (UNSD, 2021a, p. 195<sup>[18]</sup>).
- In Senegal, the Agence Nationale de Statistique et de la Démographie has assumed a leading role in national data governance as well as in the digitalisation of data collection processes from other national and sub-national institutions [country example, Senegal].

In a few cases, NSOs are taking the lead in creating new digital products and services. Some are adapting to new working methods along the data value chain, using newly available sources of data and opening up to new fields of expertise directly linked to the digital transformation of societies (UNCTAD, 2021<sup>[19]</sup>). In terms of methodology, NSOs have started using technologies like machine learning and artificial intelligence (AI) to improve their data compilation capacities (Biancotti et al., 2020<sup>[20]</sup>) and to help balance the growing demand for timely data against often shrinking resources. NSOs are also learning to extract data from the Internet and from private producers. One typical example is their use of mobile phone data to generate official statistics in the fields of population, tourism and human mobility (UNESCAP, 2019<sup>[21]</sup>) and even employment (UNSD, 2019a<sup>[22]</sup>). These data can be used in combination with or as substitutes for data that are more conventionally collected through surveys or administrative records (OECD, 2019<sup>[6]</sup>).

NSOs are moving ahead with digital transformation at different paces and with different approaches. For example, Statistics Denmark (2009<sup>[23]</sup>) took a holistic approach by including a vision for “work processes” and information technology (IT) support in its 2015 strategy. By building on this vision through standardisation of processes and methodologies and through the implementation of a modern IT architecture, Statistics Denmark aims to become more user- and data supplier-friendly. At the same time, some NSOs are addressing digital transformation on an ad hoc basis, driven by priorities (e.g. immediate data needs) or by financing opportunities (e.g. a dedicated budget or grant for implementing a specific tool or approach) that might stem from and reinforce a lack of a long-term coherent and strategic digital vision [country example Kenya ].

### ***Sufficient financial resources are key***

NSOs often do not have dedicated budgets for digital innovation that can improve the accuracy, timeliness and efficiency of statistical production instead of finding themselves competing with private data producers. All six-country examples highlight this lack of consistent and sufficient financial resources to sustain a digital transformation, as does the literature on the subject (MakStat, 2020, p. 83<sup>[24]</sup>). This can pose a real threat to the very identity of NSOs at a time when new (and big) datasets and more complex indicators are needed to understand and monitor the main challenges of the 21st century, such as climate change and sustainable development. The traditional focus of NSOs on quality and transparency, often at the expense of timeliness, might make them less attractive in the eyes of decision makers who, in a fast-paced world, increasingly favour what might be termed “good enough” timely data over perfectly accurate but already outdated data. For this reason, the OECD (2014<sup>[25]</sup>) has recommended that governments should engage in a digital transformation, also by balancing the need to provide timely official data with the need to deliver trustworthy data. Moreover, users themselves are increasingly pressuring NSOs to deliver high-quality data, statistics and services much more rapidly and in a variety of digital and interactive formats that can be consumed on smartphones or computers and that can be ingested by external applications (through machine-readable formats and application programming interfaces) (UNSD, 2021a, p. 429<sup>[18]</sup>).

### ***A wide digital divide persists***

Digitalisation needs, institutional capacity and available resources vary across and within countries. Even as a government may advance on its digital agenda, some NSOs, especially those in low and middle-income countries, may lag behind due to a lack of information technology infrastructure, leadership, legislative frameworks, competencies, change management processes and cross-sectoral collaboration

(e.g. with other governmental agencies) (Ndou, 2004<sup>[26]</sup>). In particular, change management [country example Mongolia] and access to the specific competencies, as well as infrastructure [country example Palestinian Authority], were often mentioned in the country examples as significant constraints (see Annex 1). Though digital technology has become more affordable in recent years, connectivity remains low; services such as banking and electronic payments are rarely digitalised, and the adoption of digital tools such as handheld tablets is still in its infancy in many developing countries (Casahuga, 2017<sup>[27]</sup>; Dener et al., 2021<sup>[28]</sup>). In terms of statistical processes, paper-based surveys are still much more common than computer-assisted interviews and surveys, for example, UNSD, 2019<sup>[(22)]</sup>, even though the latter have known quantified advantages in terms of increased efficiency and fewer errors (Asian Development Bank, 2019<sup>[29]</sup>).

The COVID-19 pandemic highlighted the acute relevance of digital transformation for NSOs and accelerated the need for adaptation. Demand for data increased even as lockdowns and containment measures made it more difficult for national statistical systems (NSSs) to supply data (PARIS21, 2020<sup>[30]</sup>). Alternative data sources that could be used when traditional survey-based data production is interrupted — such as mobile networks, traffic tolls and satellite data — raise ethical issues regarding data sensitivity, privacy and anonymisation, for which proper regulatory frameworks may be lacking (Oliver et al., 2020<sup>[31]</sup>). The often limited statistical capacity and weak administrative data systems of low and middle-income countries (PARIS21, 2019<sup>[32]</sup>) made it even harder for NSOs to ensure an inclusive response to the pandemic.

NSOs need well-designed plans to prepare their business models to operate digitally. These plans need to consider the environment, including the legal framework and the financial resources and stakeholders. In particular, the specific challenges and emerging opportunities that NSOs and NSS entities face in the digital age need to be systematically identified and properly addressed.

### 2.3. Aims and benefits of NSO digital transformation

Digital transformation requires NSOs to make substantial investments not only in terms of procurement of technologies (hardware, software, network infrastructure, etc.) but, first and foremost, in terms of rethinking and redesigning their value proposition, core processes and governance model. To make the digital transformation a purpose-driven endeavour, the NSO must understand and clearly describe its expected outcomes and benefits. Each situation will be different, and different NSOs might put a stronger emphasis on different aspects or identify specific and perhaps more subtle benefits. For a rough overview of possibilities, the following is a list of some potential long-term benefits stemming from a successful digital transformation alongside some country examples:

- **User-centricity.** A fully digitalised statistical production chain can facilitate the dissemination of statistical outputs (statistical tables, data services, etc.) in different flavours to match the diverse needs of its external users. While researchers might need clean microdata files, the general public, as well as policy makers, might favour real-time and interactive data services, both of which can be produced and disseminated from the same digital infrastructure. The National Institute of Statistics in Cambodia offers an example. Demonstrating a willingness to adapt its offer to the requirements of its (external) users, it involves them in the conceptualisation and design of dissemination platforms and provides regular training on these platforms to enable a wide and efficient usage of the statistical data in decision-making processes [country example Cambodia].
- **Effectiveness and quality gains.** Modern digital approaches enable NSOs to process unprecedentedly large amounts of raw data in a fraction of the time that was once required to code, input, clean, process, and analyse data from surveys and censuses. Overall data quality is also increased thanks to reduced manual errors and automated plausibility and quality control. For example, the National Administrative Department of Statistics (Departamento Administrativo

Nacional de Estadística) in Colombia has observed a much higher and faster response rate when deploying online surveys based on very robust and scalable technologies [country example Colombia]. In addition to the obvious advantages for the data collection itself, using digital tools to power survey and census management systems (such as web-based dashboards) can provide robust control in the hands of survey and census managers. This new level of efficiency can only be achieved, however, after the NSO's overarching digital capabilities are built or sharpened and a certain level of digital maturity has been reached.

- **More capabilities for digital and data innovation.** Digital and agile processes open the door to even more digital innovation: A robust and secure IT infrastructure, coupled with clear and agile policies and governance models, allows an NSO to innovate more easily by rapidly testing, evaluating and incorporating new digital technologies and approaches within the statistical production chain. In addition, such a digital environment can foster data innovation — that is, the application of complementary analytical methods to traditional and/or non-traditional data sources to generate new insights that might not otherwise have been apparent — faster and cheaper. All in all, innovation, in this case, can be understood as a new match between a need and a solution that creates value by saving time and money; and being effective. In Colombia, the National Administrative Department of Statistics has established an informal Lab of Innovation and Development, which gives it the ability to flexibly test and evaluate promising technologies [country example Colombia]. Not only does this facilitate the subsequent productive deployment of new technologies by building the necessary skills and formalising deployment and usage procedures developed during the testing phase. It also helps to coherently shape the NSO's digital landscape by avoiding opportunistic deployment of untested technologies and approaches.
- **Competitive advantage.** While the production of data and statistics has long been a prerogative of NSOs, the private sector is playing an increasing role in all spheres of the data value chain. From the automated and on-demand analysis of satellite images to the processing of big data sources (e.g. through web-scraping and AI), private companies can now provide insights, data, and statistics that directly compete with (and, in many cases, surpass) the official statistics. Failure to harness the opportunities offered by digital transformation might ultimately relegate NSOs to the role of second-zone players in this ever-growing arena. Google offers a prominent example of the new roles taken up by the private sector: Through its Google Earth Engine platform, it provides extremely powerful remote sensing and geographic information system capacities (Kaufman, 2021<sup>[33]</sup>). These can be harnessed, for instance, for environmental analyses and monitoring and directly compete with some official datasets and statistics such as land cover or forest extent statistics.
- **Data stewardship.** A digital transformation offers NSOs a unique opportunity to adjust their value proposition — one of mostly producing data and statistics to one embracing data stewardship at the government level — and thus take a leading role in all aspects related to data collection, management and dissemination (i.e. standards, capacities, methods and approaches, modelling, integration, etc.). In Senegal, the Agence Nationale de Statistique et de la Démographie has established what it calls the visa statistique, which aims to standardise how other national institutions work with, produce and disseminate data and statistics. This authorisation strengthens the NSO's role as the national data steward responsible for establishing and safeguarding best practices [country example Senegal].

## References

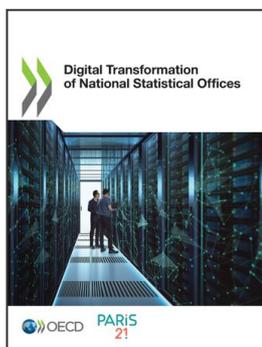
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## Notes

<sup>1</sup> Both digitisation and digitalisation processes play an important role in digital transformation. Digitisation refers to the conversion of analogue to digital; digitalisation is the direct use of information technology and digitised data. For details, see <https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/?sh=3360e5362f2c>.



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